Office of Operating Experience Analysis, EH-33 • U.S. Department of Energy • Washington, D.C. 20585

OPERATING EXPERIENCE WEEKLY SUMMARY

Office of Nuclear and Facility Safety

June 25 - July 1, 1999

Summary 99-26

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Table of Contents

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EVENTS

1. SEVERE WINDS DAMAGE BUILDING AT OAK RIDGE

On the night of June 24, 1999, at the East Tennessee Technology Park, powerful localized winds damaged the K-33 Gaseous Diffusion Building. The winds displaced refuse dumpsters by as much as 75 ft and blew an aluminum building up and over a security fence and into power lines. Heavy rain accompanied the high winds, and lightning struck power transformers, which caused a loss of power to K-33 and some surrounding buildings. The wind pulled siding and roofing material away from the structure and made three large holes in the roof, the largest of which was approximately 20 ft by 80 ft, and a 20-ft-diameter hole in the south wall 20 to 30 ft above ground level. Figures 1 and 2 show two of the holes. Personnel working in the building were not injured and cursory inspections of the building do not reveal any structural damage. The intrusion of water into an area containing fissile material, significant amounts of enriched uranium in equipment, and hazardous and mixed waste on floor areas could spread contamination and cause a criticality accident. (ORPS Report ORO--BNFL-K33-1999-0006)

Figure 1-1. Roof Hole

Figure 1-2. Side-Wall Hole

The K-33 Building, which was built in 1952, is being decontaminated and decommissioned. It is approximately 1,450 ft long by 950 ft wide by 85 ft high and has two floors containing 75,000 tons of metal machinery and piping. Investigators determined that the 25 workers inside K-33 during the storm were dismantling structural steel and non-process support systems. When the strong winds hit and lighting was lost, they initially sheltered themselves with process equipment and piping and then safely evacuated the building without injury. A crane operator in the crane's cab near the roof of the building was unable because of the power loss to position the crane so he could disembark and was rescued by other crew members.

Investigators also determined that the severe winds did not cause the breach of any fissile-material-containing process system piping or component. The loss of normal power to the building caused the radiation/criticality accident alarm system to automatically switch to a backup uninterruptible power source, which supplied the system for approximately 6 hr. The holes in the roof and one broken fire-suppression sprinkler head, both of which allowed water to intrude into the building, were over areas that had already been dismantled and were not near areas of the building still storing fissile materials. Surveys conducted by radiation control technicians indicate no contamination spread outside the building.

OEAF engineers searched the ORPS database for other events where facilities have been damaged by wind or other storm-related phenomena. Some examples follow.

- On February 2 and 3, 1999, at the Rocky Flats Environmental Technology Site, winds in excess of 100 mph caused site-wide damage and required personnel to take shelter from flying debris. The windstorm caused damage to (1) privately owned vehicles, (2) trailer roofs, (3) a valve pit enclosure, and (4) a weather structure over a trench. They also caused a loss of electrical power and minor structural damage. The total cost of the damage was over $75,000. Investigators concluded that the use of less structurally sound trailers and storage tents at the site in recent years has increased the probability of wind damage during high winds. (ORPS Report RFO--KHLL-SITEWIDE-1999-0002)

- On May 6, 1999, at the Oak Ridge Y-12 Site, severe thunderstorm and lightning activity caused a power loss in two buildings. The storm produced rainfall in excess of 2.5 in. over a 24-hr period, and two transformers supplying the buildings experienced internal winding faults from a nearby lightning strike. The estimated cost of replacing the transformers and restoring normal power to the buildings was $35,000. (ORPS Report ORO--LMES-Y12SITE-1999-0026)

- On July 23, 1997, also at the Oak Ridge Y-12 Site, a severe weather front that produced approximately 6 in. of rainfall in less than 2 hr caused damage and power loss to multiple Y-12 facilities, buildings, and equipment from strong winds, flooding, and lightning. Twenty functional buildings took in a substantial amount of water, and power outages occurred in over 70 buildings. Substantial flooding damaged the Y-12 railway spur, and railway service to the site was disrupted. The total damage caused by the storm was estimated at $4.7 million. Investigators determined that a contributing cause to this event was insufficient resources allocated to perform preventive maintenance that could have mitigated some of the damage. Several facilities experienced damage from water that entered through roof leaks, and one of the areas judged to have insufficient resource allocation was roof maintenance. (ORPS Report ORO--LMES-Y12SITE-1997-0031)

Collapsing roofs, flooding, damage to equipment and windows because of flying debris, and electrical malfunctions from water leaking into buildings are some of the problems frequently reported during severe storms. The facility's operational status should dictate the actions required to place it in a state of readiness for bad weather. Facility managers should consider seasonal weather-related problems a priority and take immediate actions to minimize damage. Flood recovery plans should be developed for facilities prone to flooding or other weather-related conditions. These recovery plans should identify the personnel, procedures, and equipment necessary for initial response and recovery efforts, including personal protective equipment requirements, location and operation of support equipment for use during severe weather and power loss, and sampling required to identify and mitigate the spread of contamination. Facility maintenance supervisors should develop a roof maintenance program that includes roof inspection requirements, roof repair schedules, roof drain maintenance, and efforts to minimize traffic on roofs to extend roof life.

It is important that facilities have plans and procedures in place before severe weather strikes. Facility managers should ensure that materials are properly packaged and protected from the weather and that their facility's emergency evacuation policy and routes are up to date, communicated to facility personnel, and identify safe locations for evacuation. A team should be established to develop and implement objectives for severe weather protection plans. The plans should ensure that the preparatory actions and requirements imposed to provide seasonal weather protection are reviewed by facility operations and safety personnel before implementation. The plans should also include walk-downs and surveillances after storms to determine if equipment or materials have sustained damage.

Facility managers should also review their system and equipment maintenance histories, policies, procedures, and work-planning processes and should walk down systems to identify equipment and systems that could be vulnerable to severe weather. Guidance for protecting facilities against weather damage can be found in the following documents.

- DOE O 420.1, *Facility Safety*, discusses a hazard mitigation program for natural phenomena. The order states that the program shall include plans for evaluating systems, structures, and components that are affected by earthquakes, winds, floods, and lightning. It also states that facilities with hazardous materials shall have procedures for inspecting the damage caused by natural phenomena and placing the facility in a safe configuration when damage occurs.

- DOE-STD-1064-94, *Guideline to Good Practices for Seasonal Facility Preservation at DOE Nuclear Facilities*, provides guidance to assist facility maintenance organizations in the review of existing methods and the development of new methods for establishing a seasonal maintenance program. Section 3.4 of the standard includes information to implement a plan for flash floods, hurricanes, tornadoes (high winds), and extreme hot/dry/severe weather.

- DOE-STD-1021-93, *Natural Phenomena Hazards Performance Characterization Guidelines for Structures, Systems, and Components,* provides guidance on assessing system operations to identify hazards to personnel and equipment and to develop hazard prevention or mitigation measures.

KEYWORDS: emergency planning, flooding, lightning, rain water, storm, weather, wind

FUNCTIONAL AREAS: Emergency Planning

2. ENTRY INTO POSTED AREA VIOLATES OPERATIONAL SAFETY REQUIREMENT

On June 17, 1999, at the Oak Ridge Y-12 Site Uranium Conversion/Processing and Handling Facility, contractor maintenance workers violated an operational safety requirement by entering a posted area without the required personal radiation detection and alarm devices or approval to enter. The radiation detection and alarm devices are required because the Criticality Accident

Alarm System (CAAS) is inaudible in that area. In addition to requiring radiation detection devices, the posting also requires the plant shift superintendent or the shift manager to approve the access. Failure to comply with access posting requirements can result in personnel radiation exposures during an inadvertent criticality, and failure to obtain access approval can hinder accountability of personnel within posted areas. (ORPS Report ORO--LMES-Y12NUCLEAR-1999-0043; Y-12 Lessons Learned Y-1999-OR-LMESY12-0604)

The workers were performing routine scheduled preventive maintenance on a supply fan and an air-handling unit in a plenum and were in the posted area for approximately 30 minutes. The plenum is posted because the CAAS had not been verified as being audible in that area during the last quarterly surveillance. Investigators determined that CAAS inaudibility had not been identified during job hazard analysis. Work planners had screened the job specific to the work package, but not to the area in which the work was to be performed. As a result, the work package did not identify the requirement for radiation detection and alarm devices and for approval to enter into the maintenance area. Not only were these requirements not identified in the work package, but the maintenance workers violated the posted requirements for entry into the plenum.

Corrective actions being considered and evaluated by Y-12 managers include the following.

- Provide physical controls in addition to administrative controls for access to posted areas associated with CAAS operational safety requirements to ensure those areas will not be entered without the required radiation detection and alarm devices.

- Review all work packages that implement work in CAAS-posted areas to ensure the operational safety dosimetry requirements are being satisfied.

- Reevaluate the job hazard investigation and analysis process for generic work packages to ensure that job-site-specific requirements are identified in areas where CAAS is inaudible.

NFS has reported other events at the Y-12 Site in which operational safety requirements were violated when postings or other CAAS coverage area requirements were not adhered to. Some examples follow.

- Weekly Summary 97-26 reported that a control center assistant at the Y-12 Site incorrectly instructed an employee to remain in a building located in a coverage zone during a CAAS test. The employee did not have a personal alarming radiation detection device and should have evacuated the area during the test. This summary also reported a similar event in which four workers did not evacuate during CAAS testing. They were in a section of an adjacent building located within the 200-ft CAAS coverage area of the building under test and did not have personal alarming radiation detection devices. The individuals heard the public address system and emergency notification system announcement of the CAAS test for the other building but wrongly assumed they did not have to evacuate their building. (ORPS Reports ORO--LMES-Y12NUCLEAR-1997-0025 and -0021)

- Weekly Summary 97-20 reported two events in which CAAS postings were violated. In the first event, a utility operator accessed a building roof without wearing a personal radiation detection device, as directed by a posting on the doorway leading to the roof. The doorway was posted because the CAAS was inaudible in this area. In the second event, an operator accessed a stairwell that also had inadequate CAAS coverage. The operator did not have the required radiation detection device. Investigators determined that the posting, which required hand-held radiation detection devices, was not visible because the door was propped open. Operators relocated the posting to ensure it was visible with the door open. (ORPS Reports ORO--LMES-Y12NUCLEAR-1997-0018 and - ORO--LMES-Y12NUCLEAR-1996-0016)

These events underscore the importance of reading, understanding, and following the posted requirements on or around doors before opening them or entering areas. Facility managers should ensure that access control signs are clearly worded, conspicuously posted, and always visible before entry. Scheduled periodic checks should be conducted to verify that required postings are present and legible. Work planning supervisors should ensure that their job hazard identification and analysis process encompasses special work area requirements and emphasizes operational safety requirements. Equally important, these events illustrate why personnel must clearly understand CAAS evacuation areas and areas of audible alarm coverage. Facility managers should ensure that personnel working in buildings that contain alarm systems, or in adjacent buildings that fall within the alarm coverage area, can hear alarms and understand announcements that require evacuation.

KEYWORDS: access control, criticality alarm, job-hazard analysis, operational safety requirement, posting

FUNCTIONAL AREAS: Nuclear/Criticality Safety, Work Planning

3. FIRE PROTECTION SYSTEM MORATORIUM AT IDAHO

This week OEAF engineers reviewed two recent events at the Idaho National Environmental Laboratory that resulted in a sitewide moratorium on facility modifications to fire protection systems and equipment, including emergency evacuation systems. On June 13, 1999, at the Idaho Nuclear Technology and Engineering Center, a plant shift supervisor determined that a portion of the plant-wide voice paging system, which is part of the Emergency Communication System (ECS), was degraded and could not fulfill its design function. On June 21, 1999, a facility manager at the Central Facilities Area reported that no compensatory measures had been taken when workers disabled the facility evacuation system to perform work. Failure to implement compensatory measures degraded the safety environment for workers and resulted in a site-wide moratorium. (ORPS Report ID--LITC-CFALL-1999-0001 and ID--LITC-LANDLORD-1999-0007)

In the June 13 event, the plant shift supervisor discovered the degraded system when he made a plant-wide voice paging announcement to activate the facility incident response team to respond to a personnel injury. Only one member of the team responded because the others had not heard the announcement. Investigators discovered that the voice paging system, which is used to communicate emergency information, is tested weekly to determine operability, because it has a history of intermittent failures. This method of determining system operability relies on personnel reporting if they do not hear the announcement. However, it does not ensure that the system remains operable after the test is concluded or that compensatory measures are in place if needed. The plant shift supervisor established a contingency plan for notifying personnel in the event of an emergency or voice paging announcement, and life safety technicians began troubleshooting the system. The technicians concluded that other portions of the ECS, such as evacuation and fire alarm communications, could also be affected by the same intermittent fault.

In the June 21 event, workers deactivated the facility evacuation system and performed work over a weekend. After the weekend, facility personnel realized no compensatory measures had been in place to alert security personnel to assist if an emergency had occurred. Investigators determined that facility personnel did not implement compensatory measures because they incorrectly believed that the systems could be activiated from other locations in the event of an emergency. They also determined that the workers performed the work in accordance with their procedures, but that these procedures were not in accordance with the site standard on work control processes. Investigators determined that a new site work control process had been implemented approximately 1 month earlier and that some planned jobs were grandfathered and did not require the procedures to be rewritten to conform to the new work control process. However, they also determined that this job had not been grandfathered and that facility personnel failed to use the new work control process for it.

These events underscore the importance of ensuring that fire protection systems are maintained in operational readiness. Work activities that render portions of these systems inoperable need to be controlled and documented. Compensatory measures, such as establishing fire watches, need to be implemented, and facility management must be informed of any change in fire protection system status. Facility managers should ensure that work controls are rigorous enough to prevent unplanned system impairments and are adequate to maintain facility and personnel safety during planned impairments. Maintenance activities should be controlled by procedure and performed in accordance with a work package. In cases where fire protection or life safety systems cannot be deemed reliable, facility managers should ensure that they are adequately monitored for operability so that compensatory measures can be implemented if the systems fail.

DOE facility managers should review the following guidance to ensure that appropriate compensatory measures are taken and maintained when systems become inoperable because of failures, when required maintenance is being performed, or when surveillance requirements are not met.

- DOE O 420.1, *Facility Safety*, requires fire protection systems for DOE facilities to include means for notifying and evacuating building occupants and means for summoning a fire department. Fire protection supervisory systems detect conditions indicative of fire, actuate local warnings, transmit notifications to a continuously attended location, and in some cases, actuate systems to extinguish or limit the spread of fire and smoke.

- DOE O 5480.19, *Conduct of Operations Requirements for DOE Facilities,* chapter VIII, “Control of Equipment and System Status,” states that the operations supervisor is responsible for maintaining proper configuration and for authorizing status changes to major equipment or systems. Changes in the status of facility equipment and systems should be reported to the governing stations or to the individual who authorized the change. Changes in the status of safety-related equipment and systems should be authorized by the supervisor and reported to the control area.

- DOE O 5480.22, *Technical Safety Requirements*, states that a limiting-condition-of-operations “establishes the lowest functional capability or performance levels of equipment required for normal safe operation of the facility.” When a limiting-condition-of-operation is not met, remedial actions (as defined by the technical safety requirements) must be taken either to restore the system or component to an operable status or to place the facility in a mode in which the system or component is not required for continued safe operation. Violations of technical safety requirements occur as a result of (1) exceeding safety limits, (2) failing to take actions required within a required time limit, (3) failing to perform surveillances within a required time limit, and (4) failing to comply with administrative control requirements.

KEYWORDS: fire protection, fire suppression, operational safety requirement

FUNCTIONAL AREAS: Fire Protection, Licensing/Compliance

4. LOAD DROPPED FROM JIB CRANE

On June 23, 1999, at the Los Alamos National Laboratory, a load of plywood and two-by-fours fell approximately 30 ft while workers were trying to lift the load to the roof of the Chemistry and Metallurgy Research Facility using a jib crane. The workers loaded the lumber on the forks of a lifting fixture and secured it with a single tie-down strap. Workers were hoisting the lumber so that they could build a work platform from which to re-roof part of the facility. After dropping the load, the workers did not stop work and did not notify their supervisor. Although no one was injured as a result of this event, inadequate hoisting and rigging and construction area safety practices placed workers and the public at increased risk of injury. (ORPS Report ALO-LA-LANL-CMR-1999-0018)

The working foreman, who was required by procedures to be present during all operations, was not present when the load was dropped. Facility personnel who observed the dropped load informed the facility manager, who went to the work site and observed that the construction area had not been taped off to control access and that not all personnel were wearing hard hats. He also observed that the lifting fixture did not have any tags or labels indicating certification.

Investigators believe that the load was dropped because it became unbalanced either as it was raised or as it was rotated about the boom axis, or because wind caused the load to tip, allowing the lumber to slip from under the single strap. They determined that after the workers dropped the load, they replaced the load on the forks of the lifting fixture and used two tie-down straps to secure the load. Investigators also determined that a worker on the ground guided the load using a tag line, but that he was well clear of the load when it fell.

NFS has reported on other occurrences involving dropped loads in several Weekly Summaries. Following are some examples.

- Weekly Summary 99-13 reported that a strongback dislodged from a docking plate and fell approximately 6 ft into a storage well at the Idaho National Engineering Environmental Laboratory Advanced Test Reactor. Riggers had accidentally snagged and lifted it while moving an irradiation test vehicle inpile tube assembly with a 10-ton bridge crane. A crane spotter saw the strongback snag the inpile tube assembly, signaled the crane operator to stop, and saw the strongback begin to fall. He moved out of the way of the strongback and its attached lifting bails to avoid being struck as they fell uncontrolled into the storage well, contacted and structurally damaged the docking plate, and contacted and chipped concrete from the reactor main floor. (ORPS Report ID--LITC-ATR-1999-0008)

- Weekly Summary 97-37 reported that a 460-lb submersible pump dropped when a 3/8-in.-diameter carbon-steel choker broke during a lift at the Hanford N-Reactor. The pump was suspended 1 ft above the water at the N-Basin south load-out pit when the rigging broke. The pump drifted down and settled on the bottom, 20 feet below the surface. Investigators believe the choker, a short wire-rope sling used to form a slip noose around the object to be lifted, was weakened by corrosion from chemicals added to maintain the basin-water pH. The choker had been submerged in the basin for over a year, and the riggers did not inspect it before the lift. (ORPS Report RL--BHI-NREACTOR-1997-0016)

These events illustrate the importance of ensuring that all aspects of a lift are evaluated for potential hazards and that any actions to mitigate identified hazards are implemented. Failures of rigging or fixtures under load are dangerous not only because of dropped loads but also because they can create missile hazards.

These events also underscore the importance of an integrated approach to safety that stresses clear goals and policies, individual and management accountability and ownership, implementation of requirements and procedures, and thorough and systematic management oversight. Workers should be trained to stop work and report conditions identified during work that are unsafe or inconsistent with expected conditions.

Personnel at DOE facilities should have a continually questioning attitude toward safety issues. Each individual is ultimately responsible for complying with rules to ensure personal safety. Facility managers should communicate the idea that safety is of prime importance and that all personnel must be committed to excellence and professionalism. Facility managers, work planners, and crafts personnel should review the following references.

- DOE-STD-1090-99, *Hoisting and Rigging*, provides guidance for hoisting and rigging and identifies related codes, standards, and regulations.

- 29 CFR 1926 specifies regulations regarding construction safety. OSHA construction safety information can be downloaded from the OSHA construction home page at http://www.osha-slc.gov/html/construction.html.

- DOE O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*, encourages the involvement of employees in identifying and controlling hazards in the workplace and describes the required elements of a worker protection program at DOE facilities. Section 14.a(2) of attachment 2, “Contractor Requirements Document,” states that workers shall be informed of foreseeable hazards and required protective measures before starting work on the affected operation.

- DOE-STD-1120-98, *Integration of Environment, Safety, and Health into Facility Disposition Activities*, provides guidance for enhancing worker, public, and environmental safety. It supports integrated safety management system principles to guide the safe accomplishment of work activities. These principles include (1) line management responsibility for safety, (2) clear roles and responsibilities, (3) competence commensurate with responsibilities, (4) balanced priorities, (5) identification of safety standards and requirements, (6) hazard controls tailored to work being performed, and (7) operations authorization. Integrated safety management information can be found at http://tis-nt.eh.doe.gov/ism.

KEYWORDS: work planning, construction, contractor controls

FUNCTIONAL AREAS: Work Planning, Industrial Safety

5. CRANE REACTIVATION DEFICIENCIES

On June 9, 1999, at the Pacific Northwest National Laboratory (PNNL), a preventive maintenance specialist discovered that the PNNL preventive maintenance group had failed to reinstate the monthly wire rope inspection required to restore a 2-ton beam crane to operability following a prolonged deactivation. On June 16, 1999, while performing the reinstated inspection, a millwright discovered that the wire rope on the crane did not match the load block sheave size and that the latch on the load hook was bent and would not function properly. Sheave grooves should match the rope size as closely as possible in order to maximize the service life of the rope and prevent the rope cross-section from deforming under load. This event was significant because the failure to reinstate all maintenance and inspection activities could have resulted in the crane being operated unsafely. (ORPS Report RL--PNNL-PNNLBOPER-1999-0021)

Investigators determined that millwrights had replaced the rope in 1992 with ¼-in. wire rope. However, they could not determine the size of the rope that was replaced. In response to these deficiencies and a similar event at PNNL involving the discovery of two different sized sheaves on a 10-ton crane on May 24, 1999, the facility manager ordered that the 2-ton beam crane be locked out of service and that all wire ropes at PNNL be inspected. As a result of the failure to reinstate all required preventive maintenance, the facility manager is considering adding more formality and rigor to the process of deactivating and reactivating facilities and equipment.

NFS has reported on other events involving post-deactivation facility condition issues. Following are some examples.

- Weekly Summary 98-50 reported a good practice involving hazard identification during decommissioning at the Oak Ridge National Laboratory East Tennessee Technology Park. Facility personnel identified a potential unreviewed safety question when they discovered five large tanks that could have contained chlorine trifluoride or fluorine. These chemicals are strong oxidizers that can ignite metal when exposed to unprepared surfaces or become explosive upon contact with organic materials. If either chemical is released, the environment would become immediately dangerous to life and health. Facility personnel had previously received lessons learned training to ensure that they make sound decisions and judgements based on reliable information and not just on previously documented facility conditions that are likely to be incomplete or inaccurate. (ORPS Report ORO--BNFL-K33-1998-0015)

- Weekly Summary 98-31 reported that during decommissioning, operations workers at the Oak Ridge National Laboratory East Tennessee Technology Park discovered that a lube oil system in a shut-down gaseous diffusion plant contained approximately 3,400 gal of oil. Investigators determined that decommissioning contractor personnel believed the lube oil system contained only residual amounts of oil, because the previous contractor reported that its workers had drained the system as part of deactivation. (ORPS Report ORO--BNFL-K33-1998-0003)

These events illustrate the importance of ensuring that deactivation work includes a thorough characterization of facility and equipment condition and that facility records are complete and readily available. This should take place before long-term surveillance and maintenance, decontamination and decommissioning, or reactivation work begins. When planning work on or near systems or components that have not been used for years, available documentation of the system status and usage may not be complete. These events are also important because of the increasing number of DOE facilities that are transitioning from long-term surveillance and maintenance to decontamination and decommissioning or reactivation activities. Deactivation, surveillance and maintenance, decontamination and decommissioning, and reactivation work planners should consult the following references.

- DOE-STD-1120-98, *Integration of Environment, Safety, and Health into Facility Disposition Activities,* May 1998, provides guidance for integrating and enhancing worker and public safety during facility disposition activities. This standard provides supplemental information for integrating project management requirements and associated guidelines contained within DOE G 430.1, *Life-Cycle Asset Management,* and amplified in the three associated implementation guides: DOE G 430.1.2, *Surveillance and Maintenance During Facility Disposition Implementation Guide;* DOE G 430.1.3, *Deactivation Implementation Guide*; and DOE G 430.1.4, *Decommissioning Implementation Guide.* This standard is designed to support an Integrated Safety Management System, consistent with the guiding principles contained in DOE P 450.4, *Safety Management System Policy*, and discussed in DOE G 450.4-1, *Integrated Safety Management System Guide*. Integrated safety management information can be found at the Safety Management website, http://tis-nt.eh.doe.gov/ism.

- DOE/EM-0142P, *Decommissioning Handbook*, March 1994, DOE Office of Environmental Management. Although the handbook is not an active document (the Office of Environmental Management is revising it), it provides valuable guidelines that may be used until the revision is complete. The handbook states that worker protection is an important element of any project. It divides worker protection issues into three categories: (1) protection from radiation, (2) protection from toxic and hazardous materials, and (3) protection from traditional industrial safety hazards. The handbook also points out that complete knowledge of the facility may not be available, which is especially likely if the operational history is long or if a lot of time has passed since operations ceased. Records tend to become lost or difficult to retrieve, and knowledgeable people forget important details or cannot be reached.

KEYWORDS: decommissioning, hazard analysis, industrial safety, pre-job planning

FUNCTIONAL AREAS: Decontamination and Decommissioning, Integrated Safety Management

6. ACCESS CONTROL TECHNICAL SAFETY REQUIREMENT VIOLATED

On June 21, 1999, at the Argonne National Laboratory—West Fuel Conditioning Facility, operating personnel determined that an operating instruction for the control of keys was inconsistent with the approved Technical Safety Requirements (TSRs). The key controls described in the TSRs are intended to implement a two-person rule for the handling of special nuclear material at a Security Category I facility. Changes in the facility mission resulted in its downgrade to Security Category III and the facility has maintained that level of security since startup in 1996. During a review of the facility's key control instruction, an operator discovered that it does not implement the system described by the TSRs for in-cell cranes or electromechanical manipulators. This occurrence is significant because it reveals a deficiency in linking TSRs with implementing instructions and procedures. (ORPS Report CH-AA-ANLW-FCF-1999-0003)

The Fuel Conditioning Facility began modifications to support the Integral Fast Reactor Program in mid-1980. This program would have required the facility to meet Security Category I requirements, and TSRs were developed for the Integral Fast Reactor Program. However, this program was canceled just before the facility was completed and it was replaced by the Spent Fuel Treatment Program, which requires the facility to meet the less restrictive Security Category III requirements. The Fuel Conditioning Facility has met the requirements of Security Category III since start-up operations began in 1996. Facility personnel recently revised the operating instruction to eliminate one safe for master manipulators, which is a level of control consistent with a Security Category III Facility. During a concurrent review of the operating instruction, an operator determined that key control has never been implemented for in-cell cranes or electromechanical manipulators as it is described in the TSRs.

In response to the discovery, facility personnel placed all material at risk in defense-in-depth confinement and secured all facility cranes, electromechanical manipulators, and master manipulators. The facility manager suspended all in-cell operations and initiated an investigation of the occurrence. Facility managers determined that the direct cause of the event was a procedure problem (defective or inadequate procedure), because the operating instructions were not consistent with the administrative requirements of the TSRs. They also determined that the root cause was a management problem (inadequate administrative control). Two administrative sections of the TSRs address requirements for security. One section addresses access control and the other addresses security and material control and accountability. The facility has always met the requirements for security and material control and accountability as defined in the TSRs. However, facility personnel did not fully address the section on access control when they developed the associated operating instructions. Additionally, managers who reviewed and approved the instructions did not ensure that they fully implemented the requirements of the TSRs. As a secondary issue, facility managers did not ensure that access requirements in the TSR were consistent with the facility's revised mission before facility start-up or during three years of start-up and operation.

Immediate corrective actions for this occurrence will include (1) revising operating instructions to implement key control for in-cell cranes and electromechanical manipulators as currently described in the TSRs and (2) initiating a change to the TSRs to reflect Category III access requirements.

OEAF engineers searched the ORPS database and identified numerous occurrences involving inadequate implementation of authorization basis requirements. The following are among them.

- Operating personnel at the Hanford Plutonium Finishing Plant determined that previous revisions of a monthly criticality drain inspection procedure had incorrectly directed operators to check glovebox floor openings that were not the drains specified in the system design description. Consequently, the procedure did not adequately implement the facility's operational safety requirements for inspection of the drains. The condition was discovered when an operator reported inconsistencies between the procedure's instructions and associated data sheets. Investigators determined that facility personnel had introduced changes to a proposed revision of the procedure between the unresolved safety question (USQ) screen and final review and approval. In another case, USQ screeners did not recognize changes because they were not highlighted as changes. (ORPS Report RL--PHMC-PFP-1999-0004)

- DOE personnel were reviewing interim technical safety requirement (ITSR) implementation at the Los Alamos National Laboratory Chemistry and Metallurgy Research Facility when they discovered that the facility's surveillance procedure for limiting combustible materials loading did not include all of the rooms subject to monthly inspections. When the ITSRs were being developed, facility and DOE personnel had discussed the possible exclusion of ten rooms from the surveillance requirement. The surveillance procedure was written and approved before final approval of the ITSRs. Procedure developers did not realize that the exclusion had not been incorporated into the authorization basis, and facility managers did not validate the procedure against information in the approved ITSRs. (ORPS Report ALO-LA-LANL-CMR-1999-0006)

- Facility personnel at the Savannah River F-Area Tank Farm implemented a procedure revision that changed the frequency of hydrogen sampling for waste tanks without initiating a change to the authorization basis. Change 4 to the procedure resulted in more tanks being sampled on a monthly basis and fewer tanks on a weekly basis. During review and approval of change 5 to the same procedure, facility personnel discovered that it was not consistent with the sampling frequencies required by the authorization basis. Investigators determined that the engineer who originated change 4 did not first initiate a routine change to the authorization basis. They also determined that the procedure for engineering technical reviews did not emphasize the need for timely changes to the authorization basis. (ORPS Report SR--WSRC-FTANK-1998-0013)

These occurrences underscore the importance of maintaining positive control of requirements contained in the authorization basis. Facility procedures must fully implement the administrative requirements of the authorization basis and they must be adequately reviewed before they are approved. Adequate review includes assurance that all changes through final approval have been screened for unresolved safety questions. Requirements in the authorization basis must be reviewed for continued applicability when missions or programs change. When a change is needed to the authorization basis, facilities must request the change, and it must be approved before operating practices are modified.

Facility managers who have not done so should consider establishing a matrix that links all commitments and requirements to their corresponding implementation vehicles. In Weekly Summary 94-48, NFS reported a good practice at Savannah River that linked databases for compliance with safety requirements. A Defense Nuclear Facilities Safety Board assessment noted the positive aspects of a linking database that relates the requirements of various authorization basis documents to the field implementation of those requirements. Before development of the new database, facility personnel maintained several independent systems that did not share information. The linking database coordinates other programs, such as surveillance testing, and combines the information into one system. Safety limits associated with specific systems and components can be identified using the database. Facility personnel can query the database about a particular procedure or test to determine which safety requirements are addressed by the procedure. The linking database also allows facility personnel to more easily determine if new procedures or procedure revisions are needed when authorization requirements change.

Many DOE and commercial nuclear organizations incorporate commitment source data into facility implementing procedures and instructions to avoid inappropriate change or removal. The most effective methods locate reference data in a procedure near the steps to which it applies, either as margin notes or in parentheses following procedure steps.

KEYWORDS: authorization basis, procedure, management

FUNCTIONAL AREAS: Licensing/Compliance, Management, Procedures

7. GLOVEBOX GLOVE FAILURE CONTAMINATES FACILITY

On June 25, 1999, at the Los Alamos Chemistry and Metallurgy Facility, a glovebox glove failure caused widespread beta contamination. Liquids were being evaporated from neutralized nitric acid solutions in three trays placed on hot plates inside two gloveboxes when the glove failed. An employee in an adjacent room heard a popping noise and looked through a connecting doorway. He noticed that a glove had come off one of the gloveboxes and observed brownish fumes issuing from the open glove port. The employee immediately evacuated the area and notified his team leader, who in turn notified facility operations center personnel. Radiological control technicians later measured general-area contamination levels ranging from 60,000 to more than 1,000,000 dpm/100 cm^2. No personnel were contaminated during this event and facility contamination was limited to two rooms. (ORPS Report ALO-LA-LANL-CMR-1999-0020)

For approximately 1½ weeks, facility personnel had been evaporating waste solutions from 15 two-liter bottles. The solutions were placed in trays, and the trays were placed on hot plates inside gloveboxes. Hot plate temperatures are regulated by a rotary dial thermostat marked with numerals instead of a temperature scale. However, process attendants verify solution temperatures, which vary from 72 to 80 degrees centigrade, by direct measurement. Evaporation was started each morning and stopped in the evening, with periodic monitoring throughout the day. The project team leader had checked solution levels approximately 1 hr before the glove failed and noted that the trays were at least ¾ full. The process was unattended when the failure occurred.

The deputy facility manager activated the facility incident command from the facility operations center, notified the emergency management and response group, and initiated a controlled evacuation of the affected wing. Evacuees were required to self-monitor as they left the wing.

Facility personnel were concerned that if power was still available to the hot plates, the solutions could boil dry and leave metal nitrate salts that could decompose and release nitrous oxide if heated to a high enough temperature. They therefore attempted to isolate power to the affected room from switchgear in a central corridor. A reconnaissance team entered an adjacent room and observed that the room lights were still on. Facility personnel then opened additional circuit breakers. They re-entered the adjacent room and reported that power was still on in the room. During a third entry into the wing, a radiological control technician entered the affected room while he was being observed by firemen outside the room and confirmed that power to the hot plates was still on. He placed a gloveport plug in the open glovebox port and sealed it with tape. He also observed circuit labels on a power panel that helped to identify circuits in the affected room and enabled facility personnel to isolate power to the room.

During a fourth entry, a hazardous materials team entered the affected room to assess conditions and perform air sampling for nitrous oxide. None was detected. Team members observed that the hot plates were de-energized and that there was no liquid in any of the three trays.

After control of the incident had been returned to the facility, radiological control technicians measured 45,000 dpm/100 cm^2 beta contamination that had carried over into a room beyond the affected room. To minimize the spread of contamination, they sealed the connecting door except for a small gap at the top, and confirmed with smoke generators that air was flowing into the affected room.

Radiological control personnel have not measured any personnel contamination or radioactive uptakes resulting from this event, and material contamination has been confined to the affected room and one room beyond it. The facility manager has initiated a formal investigation into the cause(s) of the glovebox over-pressurization. OEAF engineers will track the progress of the investigation and provide additional information as it becomes available.

KEYWORDS: emergency, evacuation, glovebox, radioactive contamination

FUNCTIONAL AREAS: Operations, Radiation Protection